

**ENGINEERING EVALUATION  
ARNTZ BUILDER  
APPLICATION #6456-PLANT #14144**

**BACKGROUND**

Arntz Builder submitted application #6456 to obtain an Authority to Construct for the following source:

**S-2 Standby Emergency Generator: diesel engine, Spectrum Detroit Diesel, Model 600DS4, Engine Model: 12V2000; Maximum Firing Rate: 6.32 MMBTU/hr, 910bhp.**

Pursuant to Regulation 2, Rule 1, Section 232, S-2 is considered as a new source.

**EMISSIONS SUMMARY**

Engine Properties (basis for annual and daily emission calculations):

S-2

Engine Displacement = 1458 cubic inches

Full-Load Output Rating = 910 bhp

Annual Use = 34 hr/yr

Fuel Type = Low Sulfur Diesel

Fuel Consumption = 44.8 gal/hr

**Emission factor (based on CARB/EPA certified manufacturer performance data)**

NO<sub>x</sub> = 6.46 g/hp-hr

HC = 0.20 g/hp-hr

CO = 0.24 g/hp-hr

PM<sub>10</sub> = 0.06 g/hp-hr

SO<sub>x</sub> = 3.23 lb/hr

<b>Pollutant</b>	<b>Emission based on 34 hours (lb/yr)</b>	<b>Max. daily emission</b>
<b>NO<sub>x</sub></b>	439.7	310.4
<b>HC</b>	13.6	9.6
<b>CO</b>	16.3	11.5
<b>PM<sub>10</sub></b>	4.1	2.9
<b>SO<sub>x</sub></b>	11.0	7.7

Maximum daily emission is based on 24 hours/day

**CUMULATIVE INCREASE**

<b>Current (ton/yr)</b>	<b>Proposed (ton/yr)</b>	<b>New Total (ton/yr)</b>

<b>NO<sub>x</sub></b>	0	0.199	0.199
<b>HC</b>	0	0.006	0.006
<b>CO</b>	0	0.007	0.007
<b>PM<sub>10</sub></b>	0	0.002	0.002
<b>SO<sub>2</sub></b>	0	0.005	0.005

## BACT

As per Regulation 2, Rule 2, Section 301, BACT is triggered for S-2, from which the NO<sub>x</sub> emissions (310.4) and CO emissions (11.5 lb/highest day) are in excess of the 10lb/highest day trigger level. Document number 96.1.2 of the District's BACT/TBACT Workbook gives BACT guidelines for the source category of IC Engines-Compression Ignition at or above 175 hp output rating in the fifth revision (last revised March 08, 2001). The BACT guidelines per this section are as follows:

POLLUTANT	BACT 1. Technologically Feasible/ Cost Effective 2. Achieved in Practice 3. TBACT	TYPICAL TECHNOLOGY
NO <sub>x</sub>	1. 1.5 g/bhp-hr [107 ppmvd @ 15% O <sub>2</sub> ] <sup>a,b</sup> 2. 6.9 g/bhp-hr [490 ppmvd @ 15% O <sub>2</sub> ] <sup>a,b,c,d</sup> 3. 6.9 g/bhp-hr [490 ppmvd @ 15% O <sub>2</sub> ] <sup>d</sup>	1. Selective Catalytic Reduction (SCR) + Timing Retard + Turbocharger w/ Intercooler <sup>a,b</sup> 2. Timing Retard $\leq 4^{\circ}$ + Turbocharger w/ Intercooler <sup>a,b,c,d</sup> 3. Timing Retard $\leq 4^{\circ}$ + Turbocharger w/ Intercooler <sup>d</sup>
CO	1. n/s 2. 2.75 g/bhp-hr [319 ppmvd @ 15% O <sub>2</sub> ] <sup>b,c</sup>	1. Catalytic Oxidation <sup>b</sup> 2. CARB or EPA (or equivalent) low-CO emitting certified engine <sup>b,c</sup>

BACT (1) for NO<sub>x</sub> is typically achieved using a selective catalytic reduction (SCR) system with timing retard and a turbocharger with an intercooler. Information on the capital cost of an SCR system for an engine of similar size to S-2 is sparse. However, the limited use of standby diesel engines does not warrant the application of a costly SCR system. Requiring SCR is also not justified by the fact that issues arise with SCR. According to an article written by Robert McInnes and Mary B. Van Wormer titled, "Cleaning Up NO<sub>x</sub> Emissions," (September, 1990), high initial capital expenditures for the catalyst and monitoring equipment are compounded by additional operating costs associated with catalyst replacement and disposal, soot blowing, ammonia consumption and electricity use (to overcome the additional pressure drop and ammonia vaporization across the system).

Another drawback of SCR is the ammonia slip phenomena, whereby unspent ammonia is leaked out of the system into the environment. Ammonia is considered a toxic air contaminant.

An alternative to SCR is Non-Selective Catalytic Reduction (NSCR); however, the cost data obtained regarding standby diesel engines indicate a cost per ton of NO<sub>x</sub> abated at \$40,000.00 per ton. This data is from a January 1991 report entitled "Noncatalytic Control of Stationary Diesel Engines" by Don Koeberlein of the California Air Resources Board. The cost data indicate a cost in excess of the District's BACT guidelines for NO<sub>x</sub> abatement set at \$17,500.00 per ton. The foregoing explanations of the cost-effectiveness of SCR and NSCR show that the BACT(1) guideline should not be applied to standby diesel engines.

BACT(2) limits NO<sub>x</sub> emissions to 6.9 grams per brake horsepower hour. The CARB/EPA certified emissions data provided by the applicant indicates that the NO<sub>x</sub> emissions from S-2 are 6.46 g/hp-hr. This value is less than the emission guideline in the District's BACT/TBACT Workbook for the specified control technology. Therefore, S-2 meets BACT(2), which is NO<sub>x</sub> emissions less than 6.9 g/bhp-hr.

BACT(2) limits CO emissions to 2.75 grams per brake horsepower hour. The CARB/EPA certified emissions data provided by the applicant indicates that the CO emissions from S-2 are 0.24 g/hp-hr. This value is less than the emission guideline in the District's BACT/TBACT Workbook for the specified control technology. Therefore, S-2 meets BACT(2), which is CO emissions less than 2.75 g/bhp-hr.

## **OFFSETS**

Offsets are not triggered for NO<sub>x</sub> or POC per Regulation 2, Rule 2, Section 302, as the NO<sub>x</sub> and POC emissions from S-2 are less than 15 tons per year. Moreover, offsets are not required for PM<sub>10</sub> and SO<sub>x</sub> emissions, as plant # 13460 is not a *Major Facility*, as per Regulation 2, Rule 2, Section 303.

## **TOXIC RISK SCREENING ANALYSIS**

The proposed emissions (1295.3 lb/yr) exceed the risk screening trigger level of 0.64 lb/yr for particulate matter. A risk screening was performed (see enclosed 12/10/02 memo from Jane Lundquist to Mohsin S. Shaikh) based on CARB/EPA certified manufacturer data and the determination was made that the risk to the maximally exposed industrial receptor is 29 in a million for 100 hours of reliability related activities. In accordance with District Toxic Risk Management Policy, the source fails the risk screen as the risk exceeds the 10 in a million, which is the acceptable level for engines that meet Best Available Control Technology for toxics (PM<sub>10</sub> emissions less than 0.15 g/hp-hr). However the engine can be operated for 34 hours without exceeding the 10 in a million threshold.

## **STATEMENT OF COMPLIANCE**

S-2 is a new, emergency standby diesel engine. As such, it is subject to the SO<sub>2</sub> limitations of 9-1-301 and 304, which impose guidelines on ground-level SO<sub>x</sub> concentrations and require sulfur

content no greater than 0.5% by weight, respectively. S-2 is expected to comply with both of these requirements because fuel with 0.05% by weight sulfur is mandated for use in California.

This application is considered to be ministerial under the District's proposed CEQA guidelines (Regulation 2, Rule 1, Section 311) and therefore is not subject to CEQA review. The engineering review for this project requires only the application of standard permit conditions and standard emission factor in accordance with Permit Handbook Chapter 2.3.

This facility is within 1,000 feet from the nearest school, thereby subjecting it to the public school notification requirements of Regulation 2, Rule 1, Section 412.

S-2 is subject to Regulation 9, Rule 8, Section 330, but expected to meet since S-2 is limited to 34 hours per calendar year for operation for reliability-related activities, based on Toxic Risk Screening Analysis.

PSD, NSPS, and NESHAPS are not triggered.

Per Regulation 6, Section 303, a person shall not emit for a period or periods aggregating more than three minutes in any hour, a visible emission that is as dark or darker than No. 2 on the Ringelmann Chart, or of such opacity as to obscure an observer's view to an equivalent or greater degree, nor shall said emission, as perceived by an opacity sensing device in good working order, where such device is required by District regulations, be equal to or greater than 40% opacity.

Since the source is an emergency standby engine, it is exempt from the provisions of Regulation 9, Rule 8, Sections 301, 302, and 502, which limit the emissions of carbon monoxide and nitrogen oxides from stationary internal combustion engines with an output rating of 50 hp or more.

Because this engine is EPA certified, source test conditions were not required to demonstrate compliance.

## **CONDITIONS**

1. S-2 shall be fired exclusively using diesel No. 2 fuel. [Basis: BACT, Cumulative Increase]
2. Emissions from the standby emergency generator, S-2, shall not exceed the following limitations:  
NOx emission = 6.9 g/bhp  
CO emission = 2.75 g/bhp  
[Basis: BACT]
3. The emergency standby generator, S-2, shall only be operated for emergency use or for reliability-related activities. Operation for reliability-related activities shall not exceed 34 hours per calendar year for S-1. Operation for emergency use is unlimited. [Basis: 9-8-330 and toxic risk screen]

Emergency use is defined as the use of an emergency standby engine during any of the following: [Basis: 9-8-231]

- 1 In the event of loss of regular natural gas supply;
- 2 In the event of failure of regular electric power supply;
- 3 Flood mitigation;
- 4 Sewage overflow mitigation;
- 5 Fire;
- 6 Failure of a primary motor, but only for such time as needed to repair or replace the primary motor.

Reliability-related activities is defined as the use of an emergency standby engine during any of the following: [Basis: 9-8-232]

- 1 Operation of an emergency standby engine to test its ability to perform for an emergency use;
- 2 Operation of an emergency standby engine during maintenance of a primary motor.

4. The owner/operator shall equip the emergency standby engine with either:  
[Basis: 9-8-530]
  - a. A non-resettable totalizing meter that measures the hours of operation for the engines; or
  - b. A non-resettable fuel usage meter , the maximum fuel rate shall be used to convert fuel usage to hours of operation.
5. Records: The owner/operator shall maintain the following monthly records in a District-approved log for at least 2 years and shall make the log available for District inspection upon request:
  - a. Hours of operation (total).
  - b. Hours of operation (emergency).
  - c. For each emergency, the nature of the emergency condition.
  - d. Fuel usage for engine(s) if a non-resettable fuel usage meter is utilized.[Basis: Regulations 9-8-530 and 1-441]

## RECOMMENDATION

Issue an Authority to Construct to Arntz Builder for the following equipment:

**S-2 Standby Emergency Generator: diesel engine, Spectrum Detroit Diesel, Model 600DS4, Engine Model: 12V2000; Maximum Firing Rate: 6.32 MMBTU/hr, 910bhp.**

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